The Forty-First Annual Report

OF THE

UNIVERSITY OF MARYLAND

Agricultural Experiment Station

College Park, Prince George County, Maryland

1927-1928

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The Station is located on the B. & O. R. R., City and Suburban Electric Car Line and the Baltimore-Washington Boulevard, eight miles north of Washington, D. C. Bell Telephone—Berwyn Exchange.

Visitors will be welcome at all times, and will be given every opportunity to inspect the work of the Station in all its departments.

The Bulletins and Reports of the Station will be mailed free of charge, to all residents of the State who request them.

ADDRESS:
AGRICULTURAL EXPERIMENT STATION,
College Park, Maryland.

UNIVERSITY OF MARYLAND
AGRICULTURAL EXPERIMENT STATION

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THE FORTY-FIRST ANNUAL RFPORT OF THE MARYLAND AGRICULTURAL EXPERIMENT STATION

For the fiscal year ending June 30, 1928

By H. J. Patterson, Director

To the Governor of Maryland and the President and Board of Regents of the University of Maryland:

Gentlemen: The Acts passed by the United States Congress making appropriations for Agricultural Experiment Stations require annual reports to be made upon the status of work conducted.

The last report gave a detailed list of the projects being pursued. There have been a few projects completed and a few additions, but not a sufficient number of changes to warrant making a reprint of the list in that report.

The new problems needing investigation increase rapidly. Though there are fairly liberal amounts given for research work, yet they do not permit of much expansion and only a few new problems can be taken up as others are completed.

It is frequently suggested that some project be discontinued for some other. Such a policy would entail much loss of time and effort and prove discouraging to investigators. Then, too, it must be remembered that a project may be relatively more important to a minor crop or product than another project might be to one of the major crops. The nature of the work to be undertaken is also circumscribed to some extent by the laws protecting the appropriations.

AGRICULTURAL RESEARCH PROFITABLE

Money expended for agricultural research in Maryland is paying a big dividend. No apologies are necessary when there is a suggestion of the need for more money; as it would mean giving a small per cent of the dividends already earned. It is conservatively estimated that the *annual increase* in the corn, wheat, forage, vegetable and fruit crops, resulting from the Maryland Station's investigations, are greater than the aggregate that the State has expended on agricultural education and research. A survey of a large number of industries has shown that they are expending an average of about 3 per cent of their gross sales on research. If Maryland provided only ½ per cent of the annual gross valuation of crops for research there would be available annually the following amounts:

For Staple Crops	$239,241
For Horticulture—	
Fruits, Vegetables, Nursery, Flowers	117,500
For Animal and Dairy Husbandry	70,555
For Poultry Husbandry	62,716

Total that ½ per cent on gross products would yield $480,012.

At the present time the State of Maryland appropriates $71,600 for agricultural research.

PROGRESS MADE IN RESEARCH DURING THE YEAR

The heads of the various departments have given the following summaries of the progress made on some of their projects during the year:

AGRICULTURAL ECONOMICS:

Prices of Farm Products Received by Maryland Producers, 1851-1925.

During the year, 1926, an historical study of farm prices in Maryland was inaugurated. This study has been in progress during the fiscal year, July, 1927, to July, 1928. The project is being carried on jointly between the Departments of Agricultural Economics and Agronomy of the University of Maryland and the United States Department of Agriculture.

Prices paid for farm products from 1851 to 1925 have been secured from farm records and diaries, store accounts, mill records, court records, newspapers and other sources. From this data it is expected that a State index number of farm prices will be constructed. Likewise, it will be useful information in determining the cycles in specific farm commodities and the changes that have taken place in cropping methods and systems. A bulletin, covering the results of this study, will soon be available for the farmers of Maryland, and other interested parties.

The Marketing of Livestock in Maryland with Particular Reference to the Baltimore Market.

This study, which was inaugurated and completed during the year, was carried on by Mr. B. B. Powell, a graduate student in the Department, as a research project for an advanced degree.

Some of the most important factors considered in this investigation are as follows: The position and importance of livestock in Maryland's agriculture; early methods of marketing livestock in this State; the development of local markets; history of the development of Union Stock Yards; volume of business, covering receipts and disposition of livestock; receipts of livestock by points of origin and kinds of shippers; kinds of buyers at the Baltimore markets; nature of shipments; commission business and rules governing; commission rates for buying and selling; yardage, feed and other miscellaneous charges; buying practices; selling practices; prices on the Baltimore market and on other terminal markets; market demand and preferences; and a comparison of the favorable and unfavorable conditions of the Baltimore market.

A brief summary of the conclusions and results of the study is presented below.

Favorable Conditions of the Market.

1. The stock yards are exceptionally well equipped, completely covered, well paved, well drained, electrically lighted throughout, and fire patrolled.

2. The livestock is unloaded promptly.

The stock yards are open at all hours of the day and night to receive livestock which is unloaded immediately upon arrival and placed in pens with feed and water.

3. The livestock is well graded.

All livestock is sorted by grade, thus permitting each grade of livestock to be sold on its own merits. This is especially true of hogs, 90 per cent of which are sold by telephone.

6. The Baltimore market does a large reconsignment business.

This allows the Eastern buyers, speculators and packer-buyers, to purchase on this market and ship to other markets or to out-of-town packers. The excellent train schedules and low reconsignment freight rates to Philadelphia, Jersey City, Wilmington, Trenton and New York afford quick and economical movement of livestock from this market to Northern and Eastern cities.

This reconsignment privilege, however, is abused in some instances for sometimes livestock having a different origin to that of the carload is substituted in the reconsignment.

7. Prices, in general, compare favorably with those of comparable grades in other markets.

Unfavorable Conditions of the Baltimore Livestock Market.

1. Too much selling is done on credit. From 75 to 90 per cent of the business is done on credit. Credit is extended to buyers for from two weeks to two months' time.

2. There are more commission merchants operating in the market than are necessary for the efficient handling and marketing of the livestock. About $15,000,000 worth of livestock is sold annually. There are 13 registered commission firms operating in the market. Half of this number or less could easily handle the entire business. In

fact the 13 commission firms in Baltimore handle fewer animals then some of the larger producers firms in the terminal markets. For example, the Chicago association handled 1,223,887 animals in 1927, valued at $29,566,355, while the 13 commission firms in Baltimore handled only 535,195 animals in 1926, valued at $15,515,000.

3. The formal hour for the opening of the market is not always observed. Sales are sometimes made very early in the morning or late in the afternoon.

4. The market lacks an efficient market reporting and news service. A comparison of the price quotations as received by the Bureau of Markets, U. S. Department of Agriculture, from the various public livestock markets, shows a striking contrast between the Baltimore quotations and those from other markets. Many of the quotations from Baltimore run the same or are quoted unchanged for one or two weeks, and occasionally for a month. Such quotations as are published in the papers are secured by messenger boys who get them from various commission firms. The Baltimore Fruit and Produce Association which quotes prices on livestock in its official publication admits that its quotations represent prices prevailing on the wharf and not at the stock yards. The total yearly receipts at the wharf are: hogs, 1,556; sheep, 842; lambs, 7,268; cattle, 1,225; and calves, 17,143. Besides being insignificant in volume this livestock is inferior in quality.

Most of the important public markets have a disinterested official reporter who reports prices in actual sales transactions.

5. Producers are not sufficiently acquainted with the Baltimore market. Practically all the livestock arriving at the stock yards is shipped by drovers. Very seldom is a farmer seen on the market. It is reported, and evidence seems to substantiate the report, that drovers are taking advantage of the producers' lack of knowledge of the market agencies and officials. Many public markets arrange tours of inspection for farmers at which time they are shown the activities of the market as well as the grading and handling of the livestock. Representatives of the railroads at the stock yards claim that they would be glad to arrange excursions for delegations of farmers and representatives of the stock yards that they would take care of groups of farmers at the yards.

6. Producers do not know the market demands.

Each market has certain preferences but the Maryland producers do not seem to know this, or knowing it, they disregard the preference demand.

Many producers breed their fattening gilts a few weeks before selling them. These are classed as piggy sows, and sold as rough packing hogs at a great reduction in price.

Trucked-in hogs are over-filled before loading. This makes for less comfort and safety in travel, results in trucked-in hogs being discriminated against by packers, and often means a reduction in price of from 25 cents to 60 cents a hundred pounds.

Too many beef bred veal calves are put on the market. One commission firm handling calves claims that 75 per cent or more of the veal calves it handles, especially from local points, are high grade or pure bred beef calves. How can beef herds be maintained if this continues?

7. Prices on good to prime cattle are not equal to those in other markets.

8. Mixed shipments of cattle and sheep, cattle and calves, and cattle and hogs is to be discouraged. Complaint has come from packers that great loss and injury results from such shipments. It is stated that frequently the small animals are so badly bruised that certain portions of the carcasses are not fit for human consumption.

Dead animals arriving at the yards are more frequent in mixed shipments, which is a source of loss to shippers.

For lack of time certain phases of livestock marketing were not covered in this study. Data covering the packing house phase of the business were collected but were not tabulated and analyzed. This phase of the study should be completed. Likewise, further study should be made of the handling of livestock at country points, and of market preferences and demand.

Membership Study of Co-operative Marketing in the Potato District of the Eastern Shore of Maryland and Virginia.

This project, which is being carried on jointly between the Federal Bureau of Agricultural Economics, the Experiment Station of the University of Maryland and the Virginia Agricultural Experiment Station, was begun January 20, 1928.

The object of the study is:

1. To determine, from the marketing experience of farmers on the Eastern Shore of Maryland and Virginia, either as members of co-operative potato exchanges or an non-members, the various social and economic factors of success of these co-operatives; to determine the attitude of non-members relative to co-operative marketing in the locality; and to determine the contribution made to co-operative marketing in this region by social and educational institutions of the area.
2. To devise ways and means of improving the relationship of members of these co-operatives.

About 400 schedules were obtained from farmers in Worcester and Somerset counties, Maryland; and Accomac and Northampton counties, Virginia. In addition, supplemental data were obtained from institutional leaders in the counties.

The data is being tabulated and analyzed. The results of the study will be published by the Federal Bureau of Agricultural Economics in co-operation with the experiment stations of Maryland and Virginia.

Economics of the Canning Industry in Maryland.

This study, which was begun in 1925, includes the cost of production, manufacture and distribution of tomatoes, sweet corn and peas. The investigation has been carried over a three-year period.

The entire costs from producer to consumer are being studied, so that it will be possible to single out wasteful, inefficient methods and practices and in this way be the means of helping to formulate an intelligent program of guidance or direction for placing the canning industry of this state on a sounder basis.

I. Cost of Production.

1. *Scope of the Study.*

This study deals with estimates on the cost of producing the three major canning crops; namely, tomatoes, sweet corn and peas. In addition to the economic phases certain production data related to the economics of the situation have been obtained. The field data embodied in this study were obtained from the farmers by personal interview during the years 1926 and 1927 and for the crop years 1925, 1926, and 1927.

2. *Some Preliminary Results.*

There appears to be very little difference in the yield of sweet corn of the two producing sections—the Eastern Shore and the Western Shore. However, in the case of peas both sections in the western part of the state yielded about 0.15 ton more per acre than the Eastern Shore. Furthermore, the variation in yield from year to year was greater on the Eastern Shore than in the western part of the state. It was of course impossible to determine whether the peas in all sections were harvested in the same stage of maturity.

For the three-year period the average yield of tomatoes per acre varied from 3.84 tons in Worcester county to 7.185 tons in Harford county. In other words, from the records obtained in this survey, the yield of tomatoes in Harford county was slightly over twice as much per acre as in Worcester county. Of the counties studied on the Eastern Shore, Talbot county gave the highest yield, an average of 6.14 tons per acre.

While all of the final production estimates have not been calculated it is possible to give here the estimated cost of producing tomatoes in two counties for comparative purposes. While the cost up to harvest and the total cost per acre is much less in Worcester county than in Harford county the cost per ton is less in Harford county due to the higher yields obtained in Harford county. This demonstrates the importance of increased yields in decreasing the cost per unit.

II. Manufacture and Distribution.

1. *Scope of the Study.*

This study covers the costs of manufacturing sweet corn, tomatoes and peas over a three-year period, 1925-1927. Detailed cost records have been obtained from approximately 300 canning factories having an aggregate output of 5,318,349 cases of canned foods.

2. *Some Conclusions Already Evident.*

No effort will be made in this brief report to point out the solution to all the problems presented. These will be fully considered in the final report. The greatest handicaps of Maryland canners are as follows:

1. Unsound financing.
2. Poorly standardized products.
3. Unsatisfactory quality in a number of cases. Better quality goods, simplicity of labeling and grading according to definite and generally accepted standards would overcome this difficulty.
4. Inadequate sales policy. Co-operation among packers is needed in the study of consumers' wants and in the advertising and sale of their products.
5. Lack of reliable market information. The market under present conditions is very unstable. Statistics on supply and demand are needed.
6. Economies in manufacture. There is need for a fuller utilization of equipment, reduction of wastes, more scientific management, etc.

Suggested Projects for Future Study.

1. Economics of the apple industry in the Cumberland-Shenandoah region.
2. The supply and distribution of Maryland tobacco.
3. Farm insurance (including crop, livestock, fire, general property and life insurance).

4. Adjusting agricultural production to meet market demands, or, a production, supply and demand study for Maryland.
5. An economic study of the poultry industry.
6. Consumers' preferences for canned foods.
7. An historic study of co-operative endeavor in Maryland.

Particular emphasis to be given to co-operation in the agricultural industry—reasons for past successes and failures and their bearing on future co-operative effort.

8. A study of crop requirements.
9. A farm management and organization study of successful and unsuccessful farms.
10. Shifting of agricultural production in Maryland and its economic causes and effect.

AGRONOMY (CROPS AND SOILS):

The work of the Department of Agronomy is now divided into four subject matter groups; namely, Crop Production; Crop Breeding; Soil Technology; and Soil Classification and Management. In each of these divisions there is maintained both research work and college teaching.

The present personnel of the department consists of four full professors, two associate professors (one elect), four assistants, and five graduate assistants.

Crop Production.

Project B-38—Corn: Variety Tests of Corn.—This project is divided into two phases; namely, tests of varieties for silage and for the mature corn. The seed used in these tests is secured from the principal seed corn growers of the state.

Project B-39—Wheat: Variety Tests.—The variety test of wheat is the oldest of the crop projects. It was started in 1888.

An extensive report on all of this work is now ready for publication. It should be noted, however, that the plots afford the best opportunity available anywhere for the study of environmental factors affecting wheat yields. The work with wheat in Charles, Baltimore, Caroline, and Washington counties is furnishing positive proof that yield and topography are closely associated.

Project B-40—Oats: Variety Tests on Winter Oats.—The four varieties, Culberson, Custis, Turf and Lee, are in test on four farms in Charles county and at the Maryland Station. These are named in the order of their preference for Southern Maryland conditions as indicated by the tests thus far. Yields have ranged from 40 to 65 bushels per acre.

Project B-42—Hay, Forage, and Pasture.—This project now consists of six sub-projects.

(a) Adaptability of red clover from various sources of seed.—Maryland, Ohio, and Tennessee grown seed have produced the best crops. Italian, German, and Hungarian have produced the poorest crops, and French, Chilian and Minnesota have been intermediate.

(b) Legumes for hay and pastures tested in grass gardens.—The legume plots in the grass gardens have been plowed and reseeded every third year as all the legumes except the alfalfa disappeared by that time. The plots will be plowed and reseeded in August, 1928.

All of the legumes with the exception of White Dutch Clover disappear very rapidly when kept mowed. Common Kansas and Grimm alfalfa have maintained themselves very good for three years, while Peruvian disappeared after the first year. Burr clover was seeded three different times without securing a crop. Sainfoin produced a fair crop but showed no merit other than what our generally used legumes possess. Landino clover, i. e., Mammoth White Clover, has produced a very luxuriant growth which it maintained for four years under both hay and mowed conditions.

(c) Effect of lime on growth of Kentucky Bluegrass in old and new lawns.—The heavier the application of lime the heavier the growth of Kentucky Bluegrass and the smaller the per cent of weeds.

Project B-43—Legumes: Variety tests for both hay and seed are in progress. About 50 new soybean varieties were added last year. Some of these are especially promising for seed yield, and several have high merit for hay. But until something better than Virginia and Wilson appear these varieties should be continued in our recommendations.

Project B-46—Wormseed: This work is in cooperation with the Chemistry Department. The first years' results indicate that the main problem centers about the handling of the crop plant selection and rate of fertilization rather than fertilizer formulas.

Project B-44: Begun 1907, revived 1921 (Kemp and Rothgeb)—Sugar corn: Seed production and breeding.

This year for the first time a sugar selection from a sugar-field corn hybrid has been sent out to canners for trial (one bushel to each of three canners). Some F_1 seed of the two best early and medium-early Connecticut hybrids and one F_1 local hybrid is being grown on a scale large enough for trials and several other local crosses are being grown for small quantities of seed. Many strains are carried for further inbreeding.

In variety test plots the best seed lots developed here are compared with commercial seed. All yield records to date are in favor of the local seed lots, but some of these lack certain desirable qualities.

Soil Classification and Management.

History of the soil survey in Maryland.—In 1892 the first soil map, based upon the texture and physical properties of soils, was issued by the World's Fair Commission of Maryland, in connection with the handbook of the state prepared at the Johns Hopkins University. The map, of necessity, was on a large scale and was on the order of a reconnaissance survey.

The groundwork for the detailed soil survey was laid by the late Professor Milton Whitney while holding the position of physicist at the Maryland Agricultural Experiment Station. According to the annual reports of the Maryland Experiment Station he held this position from 1891 to 1900, inclusive.

Because of the great variety of soils in Maryland, Professor Whitney recognized the need for their classification. A large number of soil samples were collected, from various parts of the state, for laboratory examination with respect to their physical properties. This led to the completion of a preliminary survey so far as geological structure is concerned. That is, all the important soil areas were studied with respect to the soils in the field and their relation to crops. In his annual report to the Director of the Experiment Station in 1896, Professor Whitney makes the following statement: "It is proposed to continue this work along these lines and make a detailed investigation of the soils of the state with the ultimate object of being able to map the areas adapted to the different classes of crops." In 1894, Professor Whitney was made Chief of the Division of Agricultural Soils to be a part of the Weather Service. Apparently, he served in this capacity and as physicist of the Maryland Experiment Station during the years 1894 to 1900, inclusive.

As Chief of the Division of Soils, Professor Whitney continued to make plans for the classification of soils, and in 1899 the first detailed survey of field soils was begun. These soils were mapped on a scale of an inch to the mile, the scale used in present day mapping. The areas surveyed, at this time, were Cecil county, Maryland; Connecticut Valley, Salt Lake Valley, Utah, and Pecos Valley, New Mexico. The estimated cost of surveying the soils of Cecil county, Maryland, was $1.70 per square mile. It was from this beginning of soil classification that the present elaborate classification of soils was developed. A great deal of this growth is due to the untiring efforts of Professor Whitney.

In 1922, the soil survey of the last county of Maryland was completed, just 23 years after its beginning. Some of the reports of the earlier surveyed counties, due to improved methods of classification, have since become out of date. Consequently, it has been found desirable to resurvey these counties. Thus far, five of the counties have been resurveyed; namely, Saint Mary's, Worcester, Prince George's, Harford and Cecil. Two counties are in the process of being resurveyed. These are Anne Arundel and Calvert. Four counties remain to be resurveyed; namely, Kent, Queen Anne's, Talbot and Caroline.

The soil survey work in Maryland has been under the direction of the Bureau of Soils, in co-operation with the Maryland Geological Survey and the Maryland Agricultural Experiment Station. Some financial assistance has also been given by the Maryland State Weather Service.

Thus, a great service has been rendered to the State of Maryland, for which she feels deeply indebted to the late Professor Whitney for his efforts in the establishment of the present soil survey system which has made this service possible.

ANIMAL AND DAIRY HUSBANDRY:

A test of ground versus unground soybean hay for dairy cows resulted in a slight increase in milk and butter fat as a result of grinding, but it was not sufficiently large to pay for the grinding. The conclusion was that grinding soybean hay was not economical for cows producing market milk.

Four of the cows in the Station herd qualified in Advanced Registry tests when kept with the regular herd and milked twice daily.

A study of high-protein supplements for corn has been continued, especial attention being given to the use of fish meal and of soybean oilmeal as supplements. Excellent results have been secured from the use of these feeds for fattening hogs. Results from a comparison of soybean oilmeal and fish meal for breeding gilts have not been conclusive.

Hogging down corn was continued in a small way in the fall of 1927. Under some circumstances this method of harvesting a part of the corn crop is highly satisfactory.

Work done to secure information concerning the use of whole and of ground legume hay in connection with high-protein supplements has not shown the advantage which has resulted elsewhere from the use of legume hay in connection with corn and tankage.

A comparison of light and heavy grain rations for market hogs on forage and in dry lot has been undertaken and will be continued during the coming year. Hams from the light and from the heavy ration lots are being used in the ham work which is referred to later. On forage it has been found possible to produce gains on hogs fed a light ration with a very small consumption of concentrates, but at a slow rate, as compared with gains made on a full ration. In dry lot, the use of ground legume roughage has not effected the same savings that have been associated with the use of a very light grain allowance on abundant succulent green forage.

Alfalfa and soybean hay have been used in one experiment to compare the value of roughages for fine-wool ewes and their early lambs sired by a Dorset ram. Though large differences did not occur, the results, which were excellent for each of the rations, showed an apparent slight advantage for alfalfa.

Data were gathered which will provide for a comparison of the results secured from purebred Hampshire ewes and their lambs with the results secured from one lot of fine-wool ewes used in the roughage comparison. The two widely different types offer an opportunity for comparisons which should be of practical value to sheepmen who need to decide which type of sheep will best suit their conditions.

The study of the effect of castration upon market lambs has been continued through the second year, and the third year's work has begun. The data resulting from this work will permit a comparison of rate of increase in live weight; feed required for a given increase in weight; dressed yield; character of carcass with reference to proportions of parts; and quality of the meat produced.

A study of the effect of aging upon Maryland hams has been undertaken with hams produced by the pigs used in comparison of light and heavy grain rations mentioned above.

Thus far 36 hams have been cured. It is planned to carry this work on until some of the hams are at least 24 months old. Commercial packer's hams and old farm-cured hams will be cooked and compared with the experimental hams.

In meat work the College of Home Economics is co-operating in the cooking work. In the ham work the Department of Chemistry and the Department of Bacteriology are co-operating. The Bureau of Animal Industry, U. S. Department of Agriculture is co-operating with the Experiment Station in all meat work.

A sheep survey, the object of which is to secure data concerning the present status and former stages of the sheep industry on a number of farms in different parts of the state has been begun.

There is a great need of more land for this department. The University should own the land as it is not profitable to expend money on improving land and provide buildings for animals on rented farms.

The nearness of this Station to the Animal Husbandry Farm of the U. S. Department of Agriculture makes possible the acceptance of much help and co-operation which they have generously extended.

The fine and extensive equipment at the U. S. Department of Agriculture Beltsville farm and the projects of a national character being conducted there under Maryland conditions makes their work particularly applicable to this state and makes it unnecessary to conduct many experiments which might otherwise be desirable. Their herds and flocks also have an educational value which many states, not so fortunately situated, find it necessary to provide for themselves.

ANIMAL PATHOLOGY AND BACTERIOLOGY:

The data on projects one and two, as listed in the Fortieth Annual Report, is being compiled for publication as bulletins. Work is being continued on projects three and four.

In addition to these projects this department does much in investigating, preparing and supplying farmers with various biologies, bacterins, tuberculins and legume inoculums. The demand for these products and investigations with them can not be extended or satisfactorily and properly handled in the present crowded laboratories. There is urgent need of a special sterile and isolated laboratory for the diagnosis of infectious diseases. Many of these diseases are transmissible to man. Present conditions constitute a serious hazard to the staff and students. Cases brought in for post-mortems also produce odors which are quite offensive to the other occupants of the Agricultural Building. In response to a large demand this department has done much work with poultry diseases the past year. The help rendered in this way has been greatly appreciated and gains large returns for the money expended.

To meet the present demands and the necessary future expansion of the work of this department will require much additional equipment and more money for help and maintenance. A special building should be provided for this department as early as possible.

ENTOMOLOGY:

This department has 14 active projects. Work on many of them must of necessity be more or less seasonal. There is now ready for press a bulletin giving the observations and methods for the control of a number of harmful insects.

Methods and appliances for spraying and dusting for the control of insects are becoming more and more efficient. Insects in formidable numbers are constantly increasing. This makes a big demand for information requiring investigations. This department needs more men, better facilities and a large fund for its work.

HORTICULTURE:

The work of this department is divided into Floriculture, Olericulture (vegetables) and Pomology. The complete list of projects was given in the last annual report.

Many of these studies are being conducted in the centers of the large fruit and vegetable regions in the state. Wherever it is possible to do this, it is felt that the industries will receive more value when the work is done in their commercial sections. This, however, increased the traveling expenses incurred in conducting the experimental work.

Some of the outstanding results which we feel will greatly benefit the horticultural industry in the state are:

1. Our findings relative to the value of nitrogen fertilizers for apples and peaches and the fact that it seems as if it will be possible to reduce the large amount of cultivating necessary in apple orchards if sod plus heavy nitrogen applications are used.
2. Our findings that apple yields can be greatly increased by making proper provision for cross-pollination.
3. Our results relative to the proper use of fertilizers and lime in strawberry growing should greatly benefit the strawberry industry.
4. Our experiments have shown that a full commercial crop of grapes can be secured one month sooner than usual by changing the system of grape pruning during the first two years. The shoot produced the first year after planting the orchard should be tied to the top wire of the trellis instead of being cut back to two buds.
5. We have demonstrated that peach orchards low in vigor can be profitably rejuvenated by proper pruning, fertilization, soil management and spraying practices.
6. Our pruning experiments in young peach orchards have shown that the first few crops can be doubled and tripled by a much lighter system of pruning.

7. Our studies have shown that apple trees planted in the fall or at any time before growth starts in the spring make greatly increased growth over late spring planting. Peaches do better if planted in the early spring. Best results have been secured where practically no root pruning has been done at planting time. The amount of packing of the soil at planting time about the roots should depend upon the kind of soil and moisture conditions in the soil.
8. Several desirable, early, colored apple seedlings have been produced. These are being disseminated to fruit growers for trial.
9. Our studies relative to the value of the different nitrogen carriers for orchards and the effect of such carriers, as well as other fertilizers, on the shipping and keeping quality of fruit, should be of great value to our fruit growers.
10. Our studies relative to factors influencing premature flower stalk formation in over-wintered cabbage are now being prepared for publication. The evidence should be of great value to cabbage growers.
11. The results of our canning pea studies are being adopted by several growers. Greater yields are being secured by paying attention to the proper time of planting, proper fertilizer practices, and proper inoculation. Organic matter and nitrogen have been found to be of outstanding importance.
12. Our sweet potato fertilizer studies which are now ready for publication have shown the value of potash as a fertilizer and the value of lime where the soil is acid.
13. Recent results of asparagus fertilization now being prepared for publication show practically as good yield and greater profits from commercial fertilizers as barnyard manure. Applications at the end of the cutting season have given as good results as application before. Nitrate of soda has given better results than sulphate of ammonia.
14. The results of our spinach study, and the introduction of a hardy, blight resistant spinach in the Sparrows Point section have of course been of great value to the industry.
15. Our canning studies with spinach and tomatoes have been of great value to the industry. The canned material has been exhibited at the canners' conventions for their study.
16. Our tomato variety tests have clearly shown the superiority of certain varieties and these results should be of great value to the industry.
17. Studies in plant propagation have been vigorously pursued during the past year. As yet no method has been found by which apple cuttings can be made to root commercially. Although seedling roots grow well from root cuttings, still variety roots do not grow well from cuttings, neither will cions grow when grafted on them. About 40 apple varieties have been produced on their own roots by the trench layering method. It has been shown that the most vigorous seedlings are generally the most desirable to use in propagating fruit plants. Larger trees are produced in one year when large seedlings are used.

The influence of the male parent on the growth of apple seedlings has shown that the vigor of the seedling is influenced by the male parent.

Experiments in evergreen cuttings and grafting have been vigorously pursued during the past winter in the greenhouses.

Many of the results secured as a result of our propagation studies are already of value to nurserymen. Several nurserymen have visited our greenhouse and field plots during the past season.

All projects which we are conducting appear to be of great importance and value to the industry.

Most of them have been decided upon as a result of conferences with the growers.

PLANT PATHOLOGY:

Continual Projects (J43-47). These have been carried on about as usual. The orchard and nursery inspection is done with the entomologist under the State Horticultural Law by Professor Temple. Dr. Jehle prepares the annual plant disease survey report with aid from Professor Temple and Dr. Norton. Help has been given various departments as well as people about the State, by the identification of unusual plants. Special aid has been given the Veterinary and Animal Husbandry Departments by identifying poisonous plants.

Other Active Projects (J48). A compilation of literature on carnation diseases was made, and some organisms found in the greenhouse were cultured, but those suspected did not infect healthy plants. The common stigmonose like effect is apparently a virus trouble. A study of detached carnation leaves in sugar made by Mr. Moyer did not show an increase in rust development as reported by others. This work was in co-operation with Mr. White's carnation investigation.

(J49). Except notes on some work started by Dr. Ezekiel, observations on field conditions in orchards this spring and collection of material for completion of the cytological studies, no further work was done on the sclerotinia project.

(J50). Disease resistant variety work is discussed under J54, 57, 59, 60, 62, 64, 70, etc. Mr. Moyer investigated the relation of red color in potatoes to attack by rot bacteria. The white potatoes showed less resistance than red ones.

(J51) Owing to reduction in the time available for work, by the transfer of Mr. Hunter to Truck Crop Diseases entirely, orchard spraying and some other projects in which Dr. Jehle was engaged have not been active this year.

(J52) The bulletin on Maryland grasses should soon be finished and ready for press.

(J53) Maryland trees. The trees of the campus have had considerable attention, and classification by the leaves and roots worked on.

(J54) Crimson clover is being selected for resistance to the sclerotinia disease.

(J55) No work done on chemical action on pollen.

(J56) Tomato leaf spot, under the Adams Fund, has been worked on by Mr. Moyer and Dr. Norton along the line of cultivating the Septoria parasite on different nutrients to determine the combinations that affect growth and spore formation. Also the influence of the host plant nutrition on infection by Septoria.

(J57) Wilt resistance of the most promising canning tomato varieties is under observation on plots about the state, being tested by Professor Geise. Marglobe was the outstanding wilt resistance type last year.

(J58) Mr. White is doing some work on carnation stem rot with co-operation by our Department.

(J59) Some of the new Wisconsin wilt resistant strains of Jersey Wakefield Cabbage are being tested in truckers' gardens by Professor Temple this year.

(J60) Professor Temple's stock of seed of root disease resistant selections of Alaska pea were grown by Mr. White this year and yielded above the usual yield of dried seed.

(J61) A classified list of the Mycosphaerellas is being prepared for publication. The chief work on their life history has been the major work carried on by Mr. Moyer, as his doctorate research, on methods of inducing spore production by varied nutrition in cultures.

(J62) Bulletin 290 on corn root rot and cob color was published by Jehle, Oldenburg and Temple, and new work, testing the effect of additional potash on resistance and the action of various mercury dusts on the seed, in root rot control is in progress.

(J63) No special work on peach twig canker was done, but Dr. Jehle has been testing oils in combination with bordeaux and other fungicides for peach leaf-curl control.

(J64) Dahlia diseases have continued under observation and methods of control previously worked out still hold good.

(J65) The Dahlia Trial Garden is still being carried on but with decreasing entries. The Maryland Dahlia Society has opened a trial garden of their own on the Vincent farms on Whitemarsh.

If a demonstration garden, where the newer and better varieties are grown for observation without formal scoring, could be maintained, it would be used and valued by many visitors.

(J66) Only demonstration work was done this year on dusting truck crops.

(J67) The work on wheat scab has been done chiefly by Dr. Kemp, and is incorporated in Bulletin 297.

(J68) Tomato mosaic spread in fields and methods of checking the spread has had much attention by Mr. Moyer and Dr Norton this summer and last. Pulling out early cases and avoiding, as far as possible, contact with men, horses and implements are good means of attack. Infections spread chiefly in the direction of cultivation. The early infections cause most loss in yield.

(J69) Effect of spraying in the tobacco plant beds on mosaic on the field is being tried. Estimates of the reduction in yield, quality and weight of tobacco with early or late mosaic infection shows a greater loss the earlier the infection, late infections being affected chiefly in quality.

(J70) Investigations of blight resistance in spinach is carried on chiefly by Professor Geise.

(J71) Dr. Jehle has a paper in publication of the relations of apple bud development to scab spore discharge and the spread of apple scab in fallen leaves.

(J72) Dr. Jehle and others are still working on the relation of potato seed sources to mosaic. A bulletin is in preparation on four years' work. Tuber unit selections of McCormick are being tried outdoors in spring for fall planting of this variety. Other varieties are being tested for fall potatoes to replace the McCormick, almost abandoned on account of mosaic (Bulletin 282). Different seed treatments are being compared with corrosive sublimate for potato seed diseases. The effect of potash on potato rhizoctonia is being tested.

(J73) Various Maryland bean fields from seed of different sources have been inspected showing that while some anthracnose was found in fields from western grown seed, there was much less than in eastern. Arrangement has been made with California seed companies to grow both snap and lima bean seed from their best stock and inspect seed sent here for trial to test the value of their certification. Anthracnose is not known to be present in California seed bean regions. We are planting this year on anthracnose infected fields of 1927 to see if it is carried over in the soil.

Trials to see if mildew and other lima bean diseases are carried on seed have been started.

(J75) Three new investigations have been started. Dr. Norton is co-operating with Professor Geise in the Maryland "Broccoli" investigations and Dr. Jehle is testing new dust treatments for wheat stinking smut and eradication of cucumber mosaic carriers.

PLANT PHYSIOLOGY:

K-5. A Study of the Rest Period in Potato Tubers.

The Department assisted Mr. White of the Horticultural Department in making a practical field test of the ethylene chlorhydrin treatment for breaking the rest period. The results were positive and striking. A fair crop of Irish Cobblers was obtained from seed of the current year.

K-6. A Chemical and Physiological Study of the Spindling Sprout Disease of the Potatoes.

Because of the scarcity of material this year no experiments were conducted on this project.

K-7. Physiological and Biochemical Aspects of Vegetable Storage.

Respiration tests of a large number of different kinds of vegetables were conducted to determine if the respiratory response found in potatoes after a period of cold storage is characteristic of all fleshy vegetables. All of the vegetables so far tested showed this response to a greater or less degree but we have not yet determined the cause of the great variation in the intensity of the response. We have definitely proved that the high initial respiration in vegetables after a period of cold storage is not due to the sugar that accumulates during cold storage. However, apparent correlations between the respiratory response in question and certain aspects of the carbohydrate metabolism during cold storage have been observed but not definitely established. We are not satisfied to rest on the practical importance of this peculiar respiratory response and so we are planning to delve deeper into the underlying causes.

The varietal study of physiological shrinkage of potatoes during different periods in their storage life has covered 16 different varieties and the results are now being organized for publication in a bulletin covering all of our work on Physiological Shrinkage of Potatoes. The manuscript will be submitted this summer.

K-8. Regeneration in Potato Tubers.

No new experiments were conducted on this project but a paper was published in Soil Science setting forth earlier results obtained from work prosecuted under this project.

K-9. Metabolism Studies in Sweet Corn.

Our discovery of a very high content of soluble polysaccharides in sweet corn bred by Mr. Fooks and which gives a low yield of canned product led us to concentrate our efforts last summer on the polysaccharide analysis of several strains of sweet corn including some of Professor Kemp's hybrids. We also did considerable work on the chemical properties of the soluble polysaccharides in sweet corn.

An interesting miscellaneous experiment was conducted by request of Professor Metzger. The description of this experiment together with the results obtained are given as follows:

Professor Metzger was requested to decide if some corn brought to Shriver's cannery was field corn or sweet corn as it had the appearance of field corn. The most reliable test at all stages of maturity is the content of soluble polysaccharides as a good quality of sweet corn contains from seven to eight times the content of soluble polysaccharides as field corn. We undertook to make these analyses together with the soluble carbohydrates. The results are shown in the following table. The ears of Lots One and Two had the appearance and size of kernels of field corn but the carbohydrate analyses were typical of the true sweet corn selected at the same time and place. A breeding problem is involved.

TABLE—CHEMICAL COMPOSITION OF TWO TYPES OF SWEET CORN OBTAINED AT SHRIVER'S CANNERY.

Type of Corn	Moisture	Total Sugar	Reducing Sugar	Starch	Dextrins	Total Polysaccharides	Weight per 100 Kernels
Appearance of field corn							
Lot 1	73.17	10.15	5.44	4.44	6.83	11.27	48
Lot 2	69.32	7.41	3.90	5.24	11.78	17.02	60.5
Appearance of true sweet corn							
Lot 3	76.90	13.19	6.07	4.35	7.23	11.58	24.8
Lot 4	70.99	7.86	4.15	4.88	11.46	16.34	31.4

The corn of Lots One and Three was taken from the field. The corn of Lots Two and Four was selected from a truck at the cannery and it was a little farther advanced in ripening than the corn from the field.

K-10. Physiological Aspects of Fruit Storage.

Some experiments were also carried out to establish the relative values of transpiration and respiration in the shrinkage of tomatoes during short periods of storage at the cannery. Experiments on this problem will be continued this summer.

K-11. A Study of the Pectic Constituents in Tomatoes with Reference to the Quality of the Canned Product.

The results obtained with last summer's crop were published in Bulletin No. 291.

Preliminary work was also started on tomato problems outlined for study with the 1928 crop.

K-12. A Study of the Chemical Relationship of the Various Pectic Substances.

The following statement of progress on this project was prepared by Dr. Conrad.

Since Ehrlich found that the protopectin of beets could be split into an alcohol-soluble pentosan and pectin, investigations were undertaken to determine whether during the ripening of fruits and concurrently with the development of pectin there was a corresponding appearance and increase in alcohol soluble pentosan.

The problem required the application of a very sensitive method for furfural in order to determine small quantities and this has been well met in the Fleury and Poirot colorimetric method. A difficulty with this method in that hexose carbohydrates, which give considerable quantities of hydroxymethyl furfural on distillation with 12 per cent HCL, interfere with the blue color, has been overcome by removal of the alcohol soluble sugars with washed yeast. Thus far an alcohol soluble, furfural-yielding substance has been found in ripe apples, bananas, and strawberries. In bananas and strawberries it has been found that this furfural-yielding substance increases during ripening concurrently with the increase in pectin. In apples after the pectin and furfural-yielding substance have been washed away by successive extractions with 70 per cent alcohol and water the residue on heating with N/30 HCL yields new quantities of pectin and furfural-yielding substance in approximately the same ratio they were present before hydrolysis.

Dr. Johnston has submitted the following report of progress on his projects:

Project No. 1. A Study of the Behavior of Fruit Buds and Twigs of the Peach During Winter and Spring, with Special Reference to Hardiness.

Project dormant.

Project No. 2. Mineral Nutrient Requirements of the Potato Plant.

Some earlier sand culture experiments on this project were repeated in the light of recent knowledge on the effect of boron. The results were very striking and are set forth in an article in Soil Science now on press.

Project No. 3. The Relation of Light, Temperature and Atmospheric Moisture to the Physiological Salt Balance in Nutrient Solutions for Plants.

Some data on this project have been accumulated and are being studied and worked over. More work would have been done but for the destruction of equipment by water.

Project No. 4. Symptoms of Mineral Nutrient Deficiencies in Plants, with Special Reference to the Tomato.

Submitted for approval.

POULTRY HUSBANDRY:

The principal experimental projects carried out during the fiscal year are as follows:

Project No. M. 28 Egg Laying Contest: Data being collected on the third batch of birds (100 pens of 12 each to start the year). This work is very exacting and requires detailed attention every day in the year if any reliable and worthwhile data is to be collected. Production is ahead of last year, which indicates better birds or better handling or both. Breeder interest is improving, although there seems to be a tendency to hold back for fear their birds will not show up well.

Considerable time has been put in working over the records of the second contest and items are being published along with the weekly press reports. Feed costs in the second contest was 12.82 cents per dozen. Leghorns produced eggs cheapest, their average being 12.14 cents per dozen. Miscellaneous breeds were next, their figure being 15.06. Barred Rocks were third, 15.11 cents per dozen and Rhode Island Reds fourth 15.62 cents.

Factors have been obtained for egg distribution by months as follows: November, 1.25; December, 1.57; January, 1.75; February, 2.34; March, 3.01; April, 3.24; May, 3.10; June, 2.78; July, 2.62; August, 2.33; September, 1.87; and October, 1.00. The amount of feed consumed for each dozen eggs laid was as follows: Mash, 2.7 pounds; grain, 2.47 pounds; oyster shell, 0.186 pounds; grit, 0.0397 pounds; bone, 0.0285 pounds; and 0.797 pounds straw for litter. Leghorns required 2.58 pounds mash, 2.32 pounds grain, 0.187 pounds shell, 0.0371 pounds grit, 0.0256 pounds bone, and 0.752 pounds straw for each dozen eggs produced. Rhode Island Reds 3.29 pounds mash, 3.08 pounds grains, 0.1746 pounds shell, 0.0253 pounds grit, 0.0216 pounds bone, and 0.0936 pounds straw. Barred Rocks 3.126 pounds mash, 2.974 pounds grain, 0.182 pounds shell, 0.0648 pounds grit, 0.0532 pounds bone, and 0.931 pounds straw.

There seems to be no clear cut correlation between body weight and production, though no very small bird seemed capable of making a high record. In case of egg weight there seemed to be a direct correlation with size, the larger birds on the average producing slightly larger eggs.

In calculations of feed cost for highest producing Leghorn pen with lowest producing Leghorn pen, in which no deaths occurred, it was found that feed cost per dozen in the latter pen was 38.72 per cent higher than in the high pen. Average consumption per bird of grain and mash in high Leghorn pen was 84.55 pounds, in low Leghorn pen 76.52 pounds.

Project (our No. 16) on management in the control of bacillary white diarrhea is in progress. We have succeeded in raising about 20 pullets from one hatching. There was rather heavy mortality. Apparently we are dealing with either a very virulent strain of the organism or the birds are of low natural resistance. We have some plans to throw light on this phase next year. The birds are growing nicely and look healthy and vigorous.

Special Work: We have gathered quite a fund of information with regard to toxicity of cockle in chickens. In comparatively large doses it causes deaths, apparently acting as a true poison. Professor Quigley carried on these tests last summer and we intend to check up on the results again this summer.

We made a comparatively large number of tests of feed samples that were suspected of killing chickens. These were fed to specimens of our own, under carefully controlled conditions. It is interesting to note that in not a single case were we able to reproduce the disease in our birds, which indicates that the feed was blamed for some other deleterious factor in management.

We have continued general studies on housing and management, although we cannot make any very efficient headway without provision for a more responsible caretaker. One that can be on the job at practically all times.

PUBLICATIONS.

Some of the results completed during the year have been published in the bulletins and articles listed below. There are several bulletins ready for press which cannot be printed for lack of funds.

	Pages
Bulletin 291—Pectic Constituents of Tomatoes and Their Relation to the Canned Product. By C. O. Appleman and C. M. Conrad....	1-14
Bulletin 292—The Phlox Plant Bug. By E. N. Cory and P. A. McConnell	15-22
Bulletin 293—The Effect of Overrun, Temperature and Composition on the Dipping Losses of Ice Cream. By Harlow R. Beirman..	23-34
Bulletin 294—Fertilizer Ratios for Prince George's County. By A. G. McCall	35-52

Bulletin 295—Does Tile Drainage Pay? By A. G. McCall............ 53-64
Bulletin 296—The Effect of Sulphur on Soils and on Crop Yields. By R. R. McKibbin.. 65-114
Bulletin 297—Environmental Factors Influencing Wheat Production in Maryland. By W. B. Kemp and J. E. Metzger................ 125-173
Bulletin 298—Insect Investigations. By E. N. Cory, P. D. Sanders, H. S. McConnell, P. X. Peltier, and Paul Knight............... 179-198

CONTRIBUTIONS TO SCIENTIFIC MEETINGS AND JOURNALS.

Report of Committee on Physiological Investigations. C. O. Appleman. Potato Assoc. Amer. Proc. 13. 1926.
Percentage of Carbon Dioxide in Soil Air. C. O. Appleman. Soil Sci. 24. 1927. No. 4, pp. 241-245.
The Physiology of Vegetables in Relation to Their Quality and Food Value. C. O. Appleman. Amer. Chem. Soc. Symp. 1927.
Reviews in Biological Abstracts. C. O. Appleman.
Does Fruit Thinning Increase Profits? E. C. Auchter and W. E. Whitehouse. Fruits and Gardens. June, 1927. No. 6, pp. 5 and 9.
The Latest Facts on Apple Pollination. E. C. Auchter. New Jersey State Hort. Soc. Proc. 1927. Copy of report not received.
New Developments in Pruning Peach Trees. E. C. Auchter. Peninsula Hort. Soc. Proc., Vol. 16. 1927. No. 3, pp. 40-48.
The Effect of Shade on the Growth, Fruit Bud Formation and Chemical Composition of Apple Trees. E. C. Auchter, A. L. Schrader and W. W. Aldrich. Amer. Soc. Hort. Sci. Proc., 23. 1926. Pp. 368-383.
Does Fruit Thinning Pay? E. C. Auchter. Maryland State Hort. Soc. Rpt. 29. 1927. Pp. 173-183.
The Future of the American Society for Horticultural Science. E. C. Auchter. Amer. Soc. Hort. Sci. Proc., 23. 1926. Pp. 390-402.
The Effect of Shade on the Growth, Fruit Bud Formation and Chemical Composition of Apple Trees. E. C. Auchter and A. L. Schrader. International Bot. Cong. Rpt., Ithaca, N. Y. 1926. In press.
Influence of Temperature Upon Growth and Yield of Garden Peas. V. R. Boswell. Amer. Soc. Hort. Sci. Proc., 23. 1926. Pp. 162-168.
Biochemical Study of Insoluble Pectic Substances in Vegetables. C. M. Conrad. Amer. Jour. Bot., 13. 1926. No. 9, pp. 531-547.
Reviews in Biological Abstracts. C. M. Conrad.
Laspeyresia Molesta as an Apple Pest. E. N. Cory and H. S. McConnell. Jour. Econ. Ent., 20. 1927. No. 1, pp. 190-192.
Oriental Fruit Moth Injury to Apples and Sprays for Aphis Control for 1927. E. N. Cory. Maryland Agr. Soc. Rpt. 11 for 1926, pp. 185-189. May, 1927.
How Will Vegetable Growing in Maryland Be Affected by the Mexican Bean Beetle, Japanese Beetle and European Corn Borer? E. N. Cory. Maryland Agr. Soc. Rpt., 11. 1926. Pp. 391-395. May, 1927.
A Plant Photometer. E. S. Johnston. Plant Physiol., 1. 1926. No. 1, pp. 89-90.
An Apparatus for Controlling the Flow of Nutrient Solutions in Plant Cultures. E. S. Johnston. Plant Physiol., Vol. 2. 1927. No. 2, pp. 213-215.
Teaching Elementary Entomology in the United States and Canada. P. Knight. Ent. News, 37. 1926. No. 5, pp. 144-148.
Insects, Our Friends and Enemies. P. Knight. Maryland Conserv. 1926. Winter number, p. 89.
The Insect World. P. Knight. Maryland Conserv. 1927. Summer number, pp. 4-5.
Soil Acidity Phosphate Ion. R. R. McKibbin. Internatl. Soil Sci. Cong., 1. 1927. In press.

Method of Determining Summer Emergency of Codling Moth Under Field Conditions. P. D. Sanders. Maryland Agr. Soc. Rpt., 11. 1926. Pp. 201-203. May, 1927.

Notes on the Distribution of Hesperiidae in Western Massachusetts. H. H. Shepard. Ent. News, 37. 1926. No. 10, pp. 319-324.

The Identification of Fruit Tree Varieties in the Nursery by Means of Foliage and Wood Characters. W. H. Upshall, Maryland State Hort. Soc. Rpt., Vol. 11. 1926. Pp. 245-250.

Results of Pruning and Fertilizer Demonstrations in Maryland. A. F. Vierheller. Amer. Soc. Hort. Sci. Proc., 23. 1926. Pp. 363-368.

The Effect of Heavy Versus Light Pruning on Greenhouse Roses. T. H. White. Amer. Soc. Hort. Sci. Proc., 23. 1926. Pp. 168-171. June 11, 1927.

Is Light Pruning Better Than Heavy Pruning for Greenhouse Roses? T. H. White. Florists' Exch., Vol. LXV. 1927. No. 6, 456.

Experimental Results on the Fertilizing of Asparagus. T. H. White. Maryland Vegetable Growers' Assoc. Proc. 1927. No. 9, pp. 352-356. January 5.

Cross Pollination Studies with the Delicious Apple. W. E. Whitehouse and E. C. Auchter. Amer. Soc. Hort. Sci. Proc., 23. 1926. Pp. 157-162.

Pyocyaneous Bacillosis and Mastitis Due to *Dseudomonas Aeruginosa*. E. M. Pickens. Cornell Vet., Vol. XVI. 1926. No. 3, pp. 186-202. July.

MARYLAND AGRICULTURAL EXPERIMENT STATION
STATION FARM ACCOUNT

Dr.

Balance July 1, 1927	$4,185.26
Receipts 1927-1928	25,179.10
	$29,364.36

Cr.

By Salaries	$1,810.37
Labor	14,764.09
Stationery and Office Supplies	173.44
Scientific Supplies	28.82
Feeding Stuffs	3,627.92
Sundry Supplies	1,359.58
Fertilizers	140.70
Communication Service	128.63
Travel Expenses	1,257.52
Transportation of Things	499.25
Publications	1,645.96
Heat, Light, Water and Power	527.19
Furniture, Furnishings and Fixtures	44.46
Library	12.72
Scientific Equipment	55.52
Livestock	487.00
Tools, Machinery and Appliances	640.74
Buildings and Land	1,043.11
Contingent	64.33
	$29,099.35
Credit Balance June 30, 1928	265.01
	$29,364.36

FINANCIAL STATEMENT.

MARYLAND AGRICULTURAL EXPERIMENT STATION IN ACCOUNT WITH UNITED STATES APPROPRIATIONS.

Dr.	Hatch Fund	Adams Fund	Purnell Fund
To appropriations for fiscal year 1927-1928	$15,000.00	$15,000.00	$40,000.00
Cr.			
By Salaries	$14,730.00	$13,805.00	$30,847.99
Labor	......	44.00	3,295.15
Stationery and Office Supplies	......	10.63	109.93
Scientific Supplies	110.76	208.75	348.42
Sundry Supplies	1.00	74.16	484.53
Fertilizers	......	......	......
Communication Service	60.77	......	61.80
Travel Expenses	57.09	......	2,627.53
Transportation of Things	......	......	12.95
Publications	......	......	......
Heat, Light, Water and Power	......	......	......
Furniture, Furnishings and Fixtures	......	2.80	998.93
Library	38.05	......	5.00
Scientific Equipment	......	555.46	508.62
Livestock	......	......	561.54
Tools, Machinery and Appliances	2.33	192.11	90.22
Buildings and Land	......	107.09	47.39
Contingent	......	......	......
Totals	$15,000.00	$15,000.00	$40,000.00

MARYLAND AGRICULTURAL EXPERIMENT STATION IN ACCOUNT WITH THE STATE APPROPRIATIONS.

Dr.	General Fund	Ridgely Farm
Balance July 1, 1927	......	$311.26
Receipts for Year 1927-1928	$59,552.72	5,895.32
	$59,552.72	$6,206.58
Cr.		
By Salaries	$25,766.32	$1,806.50
Labor	10,496.00	2,378.80
Stationery and Office Supplies	513.95	3.67
Scientific Supplies	624.46	24.70
Feeding Stuffs	9,882.19	1.14
Sundry Supplies	1,208.95	346.68
Fertilizers	1,807.73	311.65
Communication Service	89.50	31.95
Travel Expenses	786.19	399.98
Transportation of Things	728.43	39.78
Publications	1,228.79	18.00
Heat, Light, Water and Power	1,671.00	28.00
Furniture, Furnishings and Fixtures	484.08	25.95
Library	319.15	......
Scientific Equipment	271.50	......
Livestock	76.00	......
Tools, Machinery and Appliances	1,344.63	458.32
Buildings and Land	1,252.61	320.22
Contingent Expenses	2,298.96	......
Total	$60,850.44	$6,195.34
Overdraft July 1, 1927	2,649.33	......
	$63,499.77	$6,195.34
Overdraft June 30, 1928	3,947.05*	......
Cr. Balance June 30, 1928	......	11.24
	$59,552.72	$6,206.58

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*Due from State Treasurer.

MARYLAND AGRICULTURAL EXPERIMENT STATION IN ACCOUNT WITH REGULATORY AND PUBLIC SERVICE FUNDS.

Dr.	Biological Laboratory	Seed Inspection	State Dairymen's Association
Receipts for year 1927-1928	$12,013.23	$8,947.72	$2,401.11
Cr.			
By Salaries	$5,659.05	$7,554.94	$2,250.00
Labor	990.00	......	......
Stationery and Office Supplies	287.45	115.90	......
Scientific Supplies	480.50	73.99	......
Feeding Stuffs	260.19	......	......
Sundry Supplies	2,389.74	88.08	......
Communication Service	535.60	48.42	......
Travel Expenses	......	267.56	401.11
Transportation of Things	209.16	......	......
Publications	......	54.00	......
Heat, Light, Water and Power	852.71	137.35	......
Furniture, Furnishings and Fixtures	36.24	30.14	......
Library	......	19.09	......
Scientific Equipment	36.68	170.85	......
Livestock	2.32	......	......
Tools, Machinery and Appliances	43.12	424.53	......
Buildings and Land	184.26	......	......
Contingent	48.37	10.00	......
Totals	$13,015.39	$8,994.85	$2,651.11
Overdraft July 1, 1927	2,645.97	667.04	......
	$15,661.36	$9,661.89	$2,651.11
Overdraft June 30, 1928	3,648.13*	714.17*	250.00*
Totals	$12,013.23	$8,947.72	$2,401.11

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*Due from State Treasurer.